WHAT IS CLAIMED IS:

1. A microfluidic mixing apparatus comprising:

first driving means for driving a plurality of reagent samples from a plurality of respective source wells into a first fluid flow stream;

second driving means for introducing a separation gas between each of said plurality of reagent samples in said first fluid flow stream;

means for driving a second fluid flow stream comprising a plurality of particles;

a junction device comprising:

a first inlet port for receiving said first fluid flow stream;

a second inlet port for receiving said second fluid flow stream;

a first reaction zone for forcing mixing between said first fluid flow stream and said second fluid flow stream to thereby form a reaction product stream; and

an outlet port for allowing said reaction product stream to exit said junction device;

a second reaction zone where said plurality of reagent samples and said plurality of particles mix to form a plurality of reaction products, said reaction zone communicating with said outlet port;

reaction product driving means for driving said reaction product stream through said reaction zone; and

means for selectively analyzing said reaction product stream for said reaction products.

2. The microfluidic mixing apparatus of claim 1, wherein said first driving means comprises an autosampler.

3. The microfluidic mixing apparatus of claim 2, wherein said autosampler includes a probe and said microfluidic mixing apparatus includes a means for exposing a probe tip of said probe to a jet of gas to remove liquid from said probe tip.

4. The microfluidic mixing apparatus of claim 2, wherein said autosampler includes a probe having a conical tip.

5. The microfluidic mixing apparatus of claim 2, wherein said autosampler includes a hydrophobic probe.

6. The microfluidic mixing apparatus of claim 5, wherein said probe comprises a hydrophobic material.

7. The microfluidic mixing apparatus of claim 5, wherein said probe is coated with a hydrophobic material.

8. The microfluidic mixing apparatus of claim 2, wherein said first driving means further comprises a first fluid flow stream peristaltic pump.

9. The microfluidic mixing apparatus of claim 8, wherein a portion of said fluid flow stream passing through said first fluid flow stream peristaltic pump is contained within a high speed multi-sample tube.

10. The microfluidic mixing apparatus of claim 8, wherein said first fluid flow stream peristaltic pump is located along said fluid flow stream between said autosampler and said junction device.

11. The microfluidic mixing apparatus of claim 8, wherein said second driving means comprises a second fluid flow stream peristaltic pump.

12. The microfluidic mixing apparatus of claim 11, wherein a portion of said second fluid flow stream passing through said second fluid flow stream peristaltic pump is contained within a high speed multi-sample tube.

13. The microfluidic mixing apparatus of claim 11, wherein said first fluid flow stream peristaltic pump and said second fluid flow stream peristaltic pump comprise the same peristaltic pump.

14. The microfluidic mixing apparatus of claim 1, wherein said reaction product driving means comprises said first driving means and said second driving means.

15. The microfluidic mixing apparatus of claim 14, wherein said first driving means, said second driving means and said reaction product driving means comprises the same peristaltic pump.

16. The microfluidic mixing apparatus of claim 1, further comprising a first tubing for containing said first fluid flow stream, a second tubing for containing said second fluid flow stream and a reaction product tubing for containing said reaction product stream.

17. The microfluidic mixing apparatus of claim 16, wherein said microfluidic mixing apparatus includes a unibody flow apparatus comprising said first tubing, said second tubing, said reaction product tubing, and said junction device.

18. The microfluidic mixing apparatus of claim 16, wherein said first tubing comprises high speed multi-sample tubing.

19. The microfluidic mixing apparatus of claim 18, wherein said high speed multi-sample tubing comprises PVC tubing having an inner diameter about 0.005 to about 0.02 inches and a wall thickness of about 0.01 to about 0.03 inches.

20. The microfluidic mixing apparatus of claim 18, wherein said high speed multi-sample tubing comprises PVC tubing having an inner diameter about 0.01 inches and a wall thickness of about 0.01 to about 0.03 inches.

21. The microfluidic mixing apparatus of claim 16, wherein said second tubing comprises high speed multi-sample tubing.

22. The microfluidic mixing apparatus of claim 21, wherein said high speed multi-sample tubing comprises PVC tubing having an inner diameter about 0.005 to about 0.02 inches and a wall thickness of about 0.01 to about 0.03 inches.

23. The microfluidic mixing apparatus of claim 21, wherein said high speed multi-sample tubing comprises PVC tubing having an inner diameter about 0.01 inches and a wall thickness of about 0.01 to about 0.03 inches.

24. The microfluidic mixing apparatus of claim 16, wherein said reaction product tubing comprises high-speed multi-sample tubing.

25. The microfluidic mixing apparatus of claim 24, wherein said high speed multi-sample tubing comprises PVC tubing having an inner diameter about 0.005 to about 0.02 inches and a wall thickness of about 0.01 to about 0.03 inches.

26. The microfluidic mixing apparatus of claim 24, wherein said high speed multi-sample tubing comprises PVC tubing having an inner diameter about 0.01 inches and a wall thickness of about 0.01 to about 0.03 inches.

27. The microfluidic mixing apparatus of claim 1, wherein said first inlet port, said second inlet port and said outlet port each have an inner diameter about 0.005 to about 0.02 inches.

28. The microfluidic mixing apparatus of claim 1, wherein said first inlet port, said second inlet port and said outlet port each have an inner diameter about 0.01 inches.

29. The microfluidic mixing apparatus of claim 1, wherein said separation gas comprises air.

30. The microfluidic mixing apparatus of claim 1, wherein said plurality of reagent samples are homogenous.

31. The microfluidic mixing apparatus of claim 1, wherein said plurality of reagent samples are heterogeneous.

32. The microfluidic mixing apparatus of claim 1, wherein said particles comprise biomaterials.

33. The microfluidic mixing apparatus of claim 32, wherein said biomaterials are fluorescently tagged.

34. The microfluidic mixing apparatus of claim 1, further comprising a well plate including said plurality of respective source wells.

35. The microfluidic mixing apparatus of claim 34, wherein said well plate includes at least 60 source wells.

36. The microfluidic mixing apparatus of claim 34, wherein said well plate includes at least 72 source wells.

37. The microfluidic mixing apparatus of claim 34, wherein said well plate includes at least 96 source wells.

38. The microfluidic mixing apparatus of claim 34, wherein said well plate includes at least 384 source wells.

39. The microfluidic mixing apparatus of claim 34, wherein said well plate includes at least 1536 source wells.

40. The microfluidic mixing apparatus of claim 34, wherein said well plate includes wells having a conical shape.

41. The microfluidic mixing apparatus of claim 34, wherein said well plate is mounted in an inverted position.

42. The microfluidic mixing apparatus of claim 1, further comprising a means for injecting a buffer fluid between adjacent reagent samples in said first fluid flow stream.

43. The microfluidic mixing apparatus of claim 1, wherein at least one of said plurality of reagent samples comprises a drug.

44. The microfluidic mixing apparatus of claim 1, wherein said junction device is Y-shaped.

45. The microfluidic mixing apparatus of claim 44, wherein the angle between any two of said first inlet port, said second inlet port and said outlet port is 120°.

46. The microfluidic mixing apparatus of claim 1, wherein said junction device is T-shaped.

47. The microfluidic mixing apparatus of claim 1, further comprising a first inlet tube connected to said first inlet port, a second inlet tube connected to said second inlet port and an outlet tube connected to said outlet port, wherein said first inlet tube and said first inlet port have the same inner diameter, wherein said second inlet tube and said second inlet port have the same inner diameter, and said outlet tube and said outlet port have the same inner diameter.

48. The microfluidic mixing apparatus of claim 47, wherein said first inlet port, said second inlet port and said outlet port each have the same interior diameter.

49. The microfluidic mixing apparatus of claim 47, wherein said first inlet port and said second inlet port have the same inner diameter and said outlet port has a different inner diameter from said first inlet port and said second inlet port.

50. The microfluidic mixing apparatus of claim 49, wherein said outlet port has a larger inner diameter than said first inlet port and said second inlet port.

51. A method for mixing materials comprising:

driving a first fluid flow stream comprising a plurality of reagent samples separated by gas bubbles through a second inlet port of a junction device;

driving a second fluid flow stream comprising particles through a first inlet port of said junction device;

mixing said first fluid flow stream and said second fluid flow stream in a reaction zone in said junction device to form a reaction product stream; and

driving said reaction product stream through an outlet port of said junction device.

52. The method of claim 51, wherein said gas comprises air.

53. The method of claim 51, wherein said junction device comprises a Y-shaped junction device.

54. The method of claim 53, wherein the angle between any two of the group consisting of said first inlet port, said second inlet port and said outlet port is 120°.

55. The method of claim 51, wherein said junction devices a T-shaped junction device and said outlet port is perpendicular to said first entry port and said second entry port.

56. The method of claim 51, wherein said first inlet port has a diameter of 0.005 to 0.02 inches.

57. The method of claim 51, wherein said first inlet port has a diameter of 0.01 inches.

58. The method of claim 51, wherein said second inlet port has a diameter of 0.005 to 0.02 inches.

59. The method of claim 51, wherein said second inlet port has a diameter of 0.01 inches.

60. The method of claim 51, wherein said outlet port has a diameter of 0.005 to 0.02 inches.

61. The method of claim 51, wherein said outlet port has a diameter of 0.01 inches.

62. The method of claim 51, further comprising reacting said particles with each of said plurality of reagent samples of said reaction product stream in said reaction zone to thereby form a plurality of reaction product samples.

63. The method of claim 62, further selectively analyzing each of said plurality of reaction product samples after said plurality of reaction product samples have passed through said reaction zone.

64. The method of claim 63, by which said reaction product samples are sorted on a particle by particle basis in a flow cytometer.

65. The method of claim 51, further comprising intaking said plurality of reagent samples into said first fluid flow stream from a plurality of respective wells.

66. The method of claim 51, wherein said plurality of reagent samples are separated from each other in said first fluid flow stream by intaking air into said fluid flow stream between intaking adjacent samples of said plurality of samples.

67. The method of claim 51, wherein at least 6 reaction product samples are selectively analyzed per minute.

68. The method of claim 51, wherein at least 60 reaction product samples are selectively analyzed per minute.

69. The method of claim 51, wherein at least 120 reaction product samples are selectively analyzed per minute.

70. The method of claim 51, wherein at least 240 reaction product samples are selectively analyzed per minute.

71. The method of claim 51, wherein said plurality of reagent samples are homogenous.

72. The method of claim 51, wherein said plurality of reagent samples are heterogeneous.

73. The method of claim 51, wherein said particles comprise biomaterials.

74. The method of claim 73, wherein said biomaterials are fluorescently tagged.

75. The method of claim 51, wherein each of said reagent samples has a reagent sample size ranging from about 0.1 to about 10 μl.

76. The method of claim 51, wherein said reagent sample product flows in said reagent sample product fluid flow stream at a flow rate of about 0.1 to about 10 μl/sec.

77. The method of claim 51, further comprising injecting a buffer fluid between at least two adjacent reagent samples in said first fluid flow stream

78. The method of claim 51, wherein said plurality of reagent samples comprises at least one drug.